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What determines the demand  
for occupational pensions in Germany?

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# What determines the demand for occupational pensions in Germany?

By

Kathrin Dummann\*

*This version: October 2007*

## Abstract

*Demographic change causes an undersupply of financial old age benefits within the statutory pay-as-you-go pension system in Germany. Therefore, the provision of occupational as well as private pensions has to be enhanced. However, there seems to be an undersupply of occupational pension provision particularly in small and medium sized enterprises (SMEs). Using survey data of the German Socio-Economic Panel (GSOEP) and the German SAVE survey, the present paper studies econometrically the determinants of occupational pension provision in Germany. It shows that occupational pensions depend not only on supply-side factors such as firm size and industry, but also on demand-side factors such as individual socio-demographic attributes and people's savings motives.*

JEL-classifications: C25, G23, J14

key words: Occupational Pensions, Retirement Provision, Demographic Change, SMEs

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## 1. Introduction

Since the late 1960s, the German population ages while the rate of reproduction is stabilizing at a level of 1.4 children per woman. This demographic change results in an undersupply of financial old age benefits through the statutory pay-as-you-go pension system, if contribution rates to this system and/or retirement age remain constant. Therefore politicians as well as researchers claim that own responsibility for old age income should be enhanced by more use of private and occupational pension systems. Also people themselves are not satisfied with their financial situation for old age and are willing to place responsibility for financial income on to both private and statutory organizations (Wunder and Schwarze 2005, p.25).

Incentives are set by the state through instruments like tax benefits for both firms and employees, portability rules or shorter vesting periods. Some researchers recommend a switch from the pay-as-you-go system to the funding principle which would be useful for each pillar (statutory, occupational and private). An advantage of this capital-based system is that it is based on an interpersonal redistribution instead of an intertemporal one. However, a positive real interest rate cannot be guaranteed (Krupp and Weeber 2001, Breyer 2000).

Since January 1<sup>st</sup>, 2002, the German occupational pension system via *Entgeltumwandlung* is mandatory for employers if employees ask for it. To save for retirement five pension plan types (*Durchführungswege*) are optional for the employer (BetrAVG §1a I, as amended on 09.12.2004 (BGBl. I p. 3242)).<sup>1</sup> They allow for three different methods of financing (employer-based, employee-based or hybrid financed). Up to now, the employer-based system has been dominant in Germany, but because of complexity many employers do not provide any occupational pension yet or would like to switch to an employee-based system. This results in an undersupply of occupational old age pensions because employees are not obliged to demand such a system. This problem is common also in other countries like the US, UK and Norway. Especially small and medium-sized enterprises (SMEs) face the problem of undersupply. In descriptive surveys they often name high administration costs and cost of search for or information about external suppliers and their offered range of products as an obstacle for providing an occupational pension.

Economic research still misses to explain econometrically the incidence of occupational pensions in Germany. The purpose of this paper therefore is to evaluate the determinants of the observed gap in occupational pension provision between German firms. We first formulate hypotheses on supply and demand for occupational pensions and provide an overview of recent literature in section 2. In section 3, the hypotheses will be examined econometrically on

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<sup>1</sup> BetrAVG = Law on the Improvement of Company Pensions. Pension plan types are: book reserve schemes (*Direktzusage*), direct insurance (*Direktversicherung*), *Pensionskasse*, support fund (*Unterstützungskasse*), and pension fund (*Pensionsfonds*).

the basis of the German Socio-Economic Panel (GSOEP) and the German SAVE survey. Finally, section 4 concludes and gives an outlook on future research.

## 2. Overview of Previous Research

### 2.1 Stylized Facts

Several analyses based on surveys showed that a gap in pension provision between SMEs and large firms was an apparent phenomenon in Germany, the US, UK and Norway. Some of these found significant differences across lines of business.

In Germany, most of the interviewed people state that they do not believe the statutory pension system to be effective enough to provide money for old age. Individual retirement income by statutory pension paybacks won't be sufficient to hold the standard of living. However, many of them do not seem to be adequately informed about this issue. The same applies to employers. More than 75% of them are not aware of the fact that they are obliged to provide their employees a system of deferred compensation (R+V 2004, p.5). Most of the authors identify a gap between SMEs and large firms in pension provision, as well as between Eastern and Western Germany (Kortmann and Haghir 2005, Müller 2004, R+V 2004).

An amazing result of the surveys is people's unsatisfactory willingness to save additional money for retirement. It can be explained by the fact that the lower people's incomes the lower are their savings for retirement as these employees are liquidity constraint (Huberman et al. 2007, p. 27/28, Reifner et al. 2003, p.19/20). This is the case in Germany as the social security system offers poor and unemployed people the possibility to receive a fix transfer income (*Sozialhilfe*) which does not enable people to make payments to an occupational system dependent on income.

New findings in those surveys are provided by answers to the questions why people want to participate in a pension plan and why they reject participation.

The most often named arguments to enhance demand are advice by and competence of the consultant or the employer. Employees are aware that they are not able to inform themselves about recent developments or statutory advancements. Therefore they expect consultants to act as information intermediaries. If this criterion is fulfilled properly employees demand an occupational pension plan (HDI PM 2005, p.20/21, R+V 2004, p.6).

People are more likely to demand a pension plan if they realize that their employer feels social responsibility<sup>2</sup> or wants to increase motivation and corporate identification. In most cases of pension rejection, employees are not interested in retirement provision, because they think the offered system is too risky, the benefits from the statutory pension system are overesti-

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<sup>2</sup> This is a modern substitute for employee retention.

mated, or they will not have enough money left to save. Sometimes, employees also fear to ask their employer for a plan (HDI PM 2005, Müller 2004, Delta Lloyd 2004).<sup>3</sup>

Similar results are found by other authors who evaluated whether mobility of employees served as an additional factor of influence (see table 1).

[Table 1 about here]

Additionally, Gustman et al. (1994) mention that mobility is affected by employee's current wage and their potential capital loss. Rabe (2004) and Andrietti (2001) prove this argument for several European countries.

As Germany, countries like the US, UK, and Norway face the following problems: low participation rates in private or occupational pension systems and less retirement plan provision in SMEs than in large companies. A commonly named reason for this is: young employees and those with low income reject a participation in an occupational plan. Individual reasons are different (Ghilarducci and Lee 2005, Hinz and Turner 1998, Even and Macpherson 1994). Moreover, it has been shown that long job tenures are the result of offered pension plans (Mealli and Pudney 1996). Finally, despite 401(k) plans<sup>4</sup> which are popular in the US and do not have excessive administration cost, particularly SMEs reject pension plan provision. All these results show that pension gaps between SMEs and large firms are an important policy point at present in various countries.

The studies for Germany named above remain on a descriptive level to show the development of occupational pension plan supply and demand. It is therefore necessary to show econometrically which determinants have a statistically significant impact on pension plan provision. To fill this gap, we derive several hypotheses from economic theory in the following chapter.

## 2.2 Theoretical Background and Hypotheses

Given the gaps in the provision of pension plans by the statutory pension system, reasons as to why people demand a certain category of pension need to be evaluated.

Mitchell (1988) notes that employees make up suboptimal decisions concerning their pension plans as they are imperfectly informed about tax deference, different channels to choose and other plan characteristics. She mentions a divergence of efforts on employee and employer side due to the fact that employees have different incentives to ask for a plan. Employers are

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<sup>3</sup> These surveys include only answers from employees, unemployed are left out as they are not able to make payments to an occupational pension system during their period of unemployment. Self-employed people are excluded in most cases because their savings for old age can be added to private pension provision.

<sup>4</sup> 401(k) plans are used in the US as a hybrid financed instrument of deferred compensation with an option for the employee to opt out of this system. This way employees are permitted to benefit from current tax deferrals on current wages (Kusko et al. 1998 among others). A short discussion of 401(k) plans can be found in Munnell and Sundén (2006).

more likely to offer a plan if the firm is profitable. An equilibrium between demand by employees and supply by employers could be achieved only if we lived in a world without information cost.

Several authors identified parameters influencing a person's individual decision to participate in an occupational pension plan subject to the assumption that employers offer some. What reasons do arise for the demand for and supply of occupational pensions? Economic literature developed different hypotheses to explain influences on both employee side and employer side. The first three arguments refer mainly to supply side factors, although a clear separation between supply side and demand side is not possible.

First, pension systems could act as a mechanism of employee retention. This may be in the interest of both employees and employers. Participation in a plan implies that the employer saves a certain amount of money for the employee's retirement period. Either the same amount of money is saved as a wage deferral (defined contribution) every period or the employee is being paid out a fixed pension amount at the beginning of the retirement period (defined benefit). Gustman and Steinmeier (1993) show that defined contribution plans are more portable and therefore associated with higher employee turnover than defined benefit plans as a new employer only needs to pay defined contributions to the employee without having to guarantee the final amount of pensions from a defined benefit plan. Taylor (2000, p. 248/249) supports this hypothesis for the UK and notes that especially defined benefit plans keep employees from leaving a company. Some authors (for example Krahnen 1990, p. 200/201) call benefit plans a sponsoring mechanism of employers due to the fact that the employees' contributions are save for retirement and therefore act as a backloading mechanism by providing debt capital from inside of the firm. By funding a pension, the employer receives a credit from the employee which will be paid back when the latter retires. Contributions by the employee are disposed by the firm for the whole period of saving and thus stay within the company. Under uncertainty about possible insolvency of the firm and the risk premium they have to pay workers are not able to work as creditors. However, the employee is likely to loose the compound interest rate if he or she quits the job before retirement and changes to another employer. Then a new pension with a lower capital stock has to be built up there (Dorsey et al. 1998, Ippolito 1997, Kotlikoff and Wise 1985, Lazear and Moore 1984).<sup>5</sup> A further argument of matching the interests of employer and employee is made by Backes-Gellner and Pull (1999) who claim that the provision of a benefit in retirement periods is efficient if employees consider benefits to be better than the monetary equivalent at present. This supports the find-

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<sup>5</sup> In Germany this mechanism depends on the arrangement between employer and employee. The German law (§1b BetrAVG) guarantees the repayment of contributions to a pension system if the employee is older than 30 years or the entitlement exists for at least five years when the employee changes the job.

ing of Mitchell (1988) that it is better to inform employees about pension benefits and thus increase individual action to insure themselves for old age.

A second argument that is closely related to the hypothesis of employee retention is based on Lazear (1979). He shows that employees are able to realize the individual benefit amount of a pension plan. Therefore they avoid shirking before retirement. This is due to efficiency wages: employees earn lower wages than their marginal product of labor at younger age and higher wages when they get older. So employer and employee build up an implicit contract. An anticipated capital loss evoked by job loss because of shirking leads to a reduction of employee mobility. Otherwise people would look for a job in which they are not offered a pension. Moreover, the avoidance of shirking may have the additional effect of decreasing training costs and the costs of finding and recruiting new staff as employees have an incentive to work harder and have a longer tenure (McCarthy 2006, Allen et al. 1993). An impact on motivation and loyalty by fringe benefits or occupational pensions could be proved for the US (Allen et al. 1993) but not for Germany (Frick et al. 1999). Our first hypothesis therefore is

*H<sub>1</sub>: A longer tenure in a firm goes along with higher motivation. As motivation is enhanced by occupational benefits there is a positive relationship between the probability of adopting a pension and tenure.*

The third argument refers to economies of scale achieved by large firms. If a firm employed a large number of employees it could offer a pension plan that required possibly higher fixed costs of administrative expenses.<sup>6</sup> So, the costs per employee decrease with firm size. Furthermore, large firms have a higher probability to survive business cycle fluctuations and are more able to earn extra money to pay for higher pensions. A small firm would not be able to pay a pension if it went bankrupt. The risk of becoming insolvent is higher for small firms than for large firms. Furthermore, a case of death or invalidity could result in high payments, which reduce cash-flow and may cause insolvency, if the employer did not save enough for an event like that. This risk is higher for small firms than for large firms because large firms are more able to calculate the probability of a sudden case of death. Finally, economies of scale and bankruptcy risk differ across lines of business (Horiba and Yoshida 2002, Aoki 1984, Mitchell and Andrews 1981).

This leads us to two further hypotheses:

*H<sub>2</sub>: Large companies are more likely to offer a pension plan than small companies.*

*H<sub>3</sub>: The demand for occupational pension plans differs across lines of business and regions.*

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<sup>6</sup> Administration costs differ across ways of pension provision. Thus, Dorsey (1987) provides empirical evidence that firms with low monitoring costs like small companies are more likely to offer defined contribution plans whereas large firms offer defined benefits more often.



From the view of human capital theory we have to add that people who are offered a pension plan, who are well informed and stay longer at a firm tend to be more productive than others. The reason for this is that employees acquire firm-specific human capital that as a result increases firm productivity (Becker 1964, Andrietti and Patacchini 2004, p.2). This could not be rejected for the US (Cornwell and Dorsey 2000).

As Mitchell (1988) points out educated employees and women are better informed about details of pension plans as they are more likely to be involved in the process of getting information about pension determinants. Bernstein (2002, p. 2065) supports this argument by pointing out that educated people are better aware of tax reductions which are related to pension plans and other types of fringe benefits, therefore we develop hypothesis 4.

*H<sub>4</sub>: As female and well educated people are better informed, they know better about the advantages of occupational pensions and therefore have a higher probability of participating in a plan.*

Mincer (1976) tested several sociodemographic factors (like schooling, hours worked, gender) and their influence on individual income. We suggest that these factors influence retirement income too, as Blundell et al. (1994) found out that demographic attributes and labor market variables significantly influence intertemporal behavior. Freeman (1985) additionally uses information about labor union membership based on the model of union monopoly power and its collective voice, showing both theoretically and empirically that it has a positive influence on pension plan demand. Further empirical evidence on the impact of labor unions on labor compensation by cash wages and fringe benefits is provided by Long and Scott (1982). Besides, Gustman et al. (1994) argue that mobility is affected not only by the employee's current wage, but also by the capital loss occurred from a job change.

Thus, we expect:

*H<sub>5</sub>: The demand for occupational pension plans depends on sociodemographic attributes (e.g. income, age, marital status, position, and number of children).*

*H<sub>6</sub>: Savings motives based on individual circumstances influence the willingness to provide for retirement.*

These hypotheses shall be tested in the following chapter.

### 3. Empirical analysis

#### 3.1 Data

The data used in this study have been taken from the German Socio Economic Panel (GSOEP) and the German SAVE survey. The GSOEP is an annual survey among German individuals with questions concerning several socioeconomic factors with every wave focusing on a special topic. From 1985 to 1995 questions concerning occupational pensions were asked. Thus, the most recent data available refer to 1995.<sup>7</sup> The dataset of our analysis contains 13768 people who were asked to participate in the survey.<sup>8</sup> The answers to the questions about occupational pension coverage are displayed in table 2. As shown in the first column, in 1995 almost 2000 people in our dataset worked in a firm that offered a pension plan, but only 1392 of them (73%) were entitled in a plan (see second column). It is an astonishing fact that 16% of those who answered the question “In some companies the employees are offered a company pension in addition to social security. Does your company offer this for all or some of its employees?” did not know whether their firm offered a pension plan. This is a hint to an undersupply of information inside firms as a lot of people are not aware of their possibility to make retirement provisions. Moreover, 87.8% of the people considered in this study are not entitled in plans from an earlier employer. This could possibly be due to the fact that the mean age of people owning an occupational pension is 41.7 years. People of this age are more likely to be bound to the firm than younger employees who are more career-minded. 35.7% of the total number of employees entitled in an occupational pension plan are female, and 64.3% of them are male.

[Table 2 about here]

Another possible reason for the apparent low mobility might be that before 2002 the portability and vesting rules had been more restrictive and more complex. The rules concerning vesting periods are a popular example<sup>9</sup>:

An employee participating in an occupational pension plan keeps his entitlements if he leaves the firm before occurrence of an insured event only if he is at least 35 years old and either the pension promise exists for at least 10 years or the employee is employed at that firm for at least 12 years and his pension promise exists for at least 3 years (BetrAVG §1 I 1, as amended

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<sup>7</sup> Due to a small number of answers in earlier waves and therefore resulting small variance in the dataset we concentrate our analysis on the year 1995 and compare the results to those of the year 2005 based on the German SAVE survey. As the “Riester-pension” had been introduced in 2001 we are not able to evaluate a relationship between Riester pension and occupational pensions in 1995.

<sup>8</sup> The number of answers differs between the different parts of the questionnaire. For a detailed description of the survey see Haisken-DeNew and Frick (2005).

<sup>9</sup> The BetrAVG has been revised several times and legislators tried to simplify the rules but in some cases like vesting and portability it is still complex due to several exceptions.

on 05.10.1994 (BGBl. I p. 2911)). After exclusion of self-employed people from our analysis 31% of those who are subordinates in a small firm do not own an occupational pension whereas almost 85% of those employed at a large firm (2000 and more) have claims in a pension system.<sup>10</sup> This can be seen from table 3.<sup>11</sup>

[Table 3 about here]

Concerning hypothesis 5 derived above, our dataset suggests that people with higher wages<sup>12</sup> have a higher probability to participate in an occupational pension scheme. To show this we took the quartiles of individual income and related them to firm size with respect to the fact that the person owns a claim in occupational pensions. Table 4 points out that in our dataset most people with high income are employed in large firms, which refers to the thesis that large firms achieve economies of scale in administration costs.

[Table 4 about here]

On a descriptive basis no clear answer can be given on the question about the relation between education and pension coverage. 81% of those with a university degree are entitled in a pension plan but almost 83% of those with no university degree as qualification for their current job are entitled in a pension plan, too.<sup>13</sup> Besides socio-economic attributes the GSOEP contains questions on people's savings behavior as well as attitudes towards assets, income and life satisfaction. Therefore we include these variables in our analyses to control for an influence of psychological factors.

In order to find out whether people's attitude towards pension plan adoption changed during the past ten years we use the German SAVE survey that includes both socio-economic attributes and questions on people's savings behavior, attitudes towards assets and income, too. The survey started in 2001 and the second wave followed in 2003. The third wave we use, including 2305 households, was collected in summer 2005.<sup>14</sup> The weights used on the multivariate level are based on the distribution of income and age of the German sample census of the respective year.<sup>15</sup>

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<sup>10</sup> 19 self-employed people are excluded from this part of our analysis.

<sup>11</sup> SMEs can be defined differently: Some use yearly turn-over or total assets. The EU defines SMEs up to a number of 250 employees. Deviating from this we define in our dataset SMEs due to the data structure from less than 5 employees to an upper limit of 200 employees.

<sup>12</sup> We approximate wages by using average monthly household income.

<sup>13</sup> On the multivariate level weights based on a person level projection factor defined as the inverse of the corrected probability to be drawn (*korrigierte Ziehungswahrscheinlichkeit*) are used.

<sup>14</sup> More detailed information on the composition of the dataset and its methodological aspects can be found in Schunk (2006a) and Schunk (2006b).

<sup>15</sup> In contrast to the GSOEP the SAVE dataset does not contain information on lines of business or firm size. Therefore, we are not able to estimate whether substantial differences in pension coverage exist across lines of business or firm sizes between year 1995 and 2005.

In times of demographic change with a decreasing amount of money paid to retirees by the statutory pension system it could be useful for those who believe to have an above-average life expectancy to provide for old age via occupational pensions. These may care for themselves as they would be extremely influenced by lower payoffs and could possibly face old age poverty. The SAVE data show on a descriptive basis that only 15.0 (8.5) percent of those expecting to live longer than an average person use occupational (private) pension plans to fill their individual gap in financial benefits. But there is still the question whether supposed life expectancy has a statistically significant influence on individual pension plan demand.

Furthermore, it can be argued that people participating in private pension plans may value these as a substitute for occupational pensions. The SAVE dataset shows that 19.3 percent of those participating in an occupational pension plan have a private pension as well and 8.3 percent of those not having an occupational pension have a private pension instead (see table 7). It is amazing that more than 90 percent of those not participating in occupational plans do not provide for old age on their own.<sup>16</sup> Calculated with reference to the whole survey we see that 79% of all people participating in the SAVE survey care neither privately nor occupationally for old age. Therefore the descriptive statistics do not support the argument of occupational and private pensions being substitutes.

[Table 5 about here]

A closer look has to be taken on the multivariate level. To test the above hypotheses, we will do the following estimations.<sup>17</sup>

### 3.2 Estimation method

We use data consisting of all male and female employees who hold claims in occupational pensions either at the actual employer or at a former employer or not at all.<sup>18</sup>

First we estimate the probability  $P$  of an individual person  $i$  (or a firm) owning (offering) an occupational pension ( $Y = 1$ ) in terms of a vector of socioeconomic attributes  $X_i$ . As the resulting dependent variable is a binary one we have to estimate a binary probit model underlying the assumption of a cumulative standard normal distribution function which can be written as

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<sup>16</sup> A possible explanation might be a misunderstanding in the questionnaire: Many people who participate in this survey might not have a usual product which could be counted as a private or occupational way of pension provision. But in 1995 almost 9 million households (almost 2.3 million households at the age of 40-50 years) in Germany were owners of a flat or a house which can be counted as a way to provide for old age (source: GSOEP 1995). This might be due to the fact that real estate (or reverse mortgage) as a mechanism to provide for retirement becomes more and more popular now but had not been regarded that way in 1995. The same argument applies to life insurances.

<sup>17</sup> The importance of micro-level data for demand analysis compared to aggregate data has been evaluated and discussed by Blundell et al. (1993).

<sup>18</sup> Those who answered “don’t know” will be treated as missing.

$$P_i = \Pr(Y = 1) = \Pr(I_i^* \leq I_i) = F(I_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_1 + \beta_2 X_i} e^{-t^2/2} dt \quad (1)$$

with  $I^*$  incorporating an unobservable utility index<sup>19</sup> of individual  $i$  and  $t$  being a standardized normal variable  $t \sim N(0,1)$ .

As the utility index  $I$  is being defined as  $I_i = F^{-1}(P_i) = \beta_1 + \beta_2 X_i$  it can be estimated econometrically as (2) with  $u_i$  being the error term

$$I_i = \beta_1 + \beta_2 X_i + u_i. \quad (2)$$

Socioeconomic attributes included in vector  $X_i$  of individual  $i$  are:

Variable	Definition	Expected sign
$OP_i$	dummy variable equal to 1 if individual $i$ acquires claims of an occupational pension or (in a second set up) if a firm offers individual $i$ a pension plan	Dep. var.
$TEN_i$	tenure (years) of employee $i$ at his current employer	+
$FIRMSIZE$	vector of dummy variables for the number of employees of the firm individual $i$ is employed in <sup>20</sup>	Small – Large +
$INDUSTRY$	vector of dummy variables for industry at one-digit level	Manufacturing +/- Intermediaries +
$REGION_i$	dummy variable equal to 1 if individual $i$ lives in Western Germany	+
$GENDER_i$	dummy variable equal to 1 if person $i$ is male	+
$EDU_i$	dummy variable equal to 1 if individual $i$ needed a university degree to get his or her job <sup>21</sup>	+
$INC_i$	total net monthly income of all household members person $i$ is the head of	+
$MARITAL_i$	dummy variable equal to 1 if individual $i$ is married	+
$AGE_i$	age (years) of person $i$	+
$FOP_i$	dummy variable equal to 1 if person $i$ owns an occupational pension from a former employer	+
$POSITION_i$	dummy variable equal to 1 if individual $i$ is a blue-collar worker	-
$CHILD_i$	dummy variable equal to 1 if there are children under age 16 living in the household of individual $i$ , in 2005 it is the number of children under 16 living in the household of individual $i$	-
$MOTIVE_i$	vector of variables including dummy variables on whether person $i$ expects to live longer than average, whether $i$ owns a Riester pension and whether $i$ owns a private pension (except Riester), as well as questions on	Life expectancy + Unemployment – Standard of living + Econ. situation +

<sup>19</sup> This is what Gujarati (1995) names a critical value in decision making.

<sup>20</sup> D1: less than 5 employees, D2: 5-19, D3: 20-199, D4: 200-1999, D5: 2000 and more

<sup>21</sup> For 1995 we used EDU as proxy for education of individual  $i$  because data are not available. This way we are able to catch up time preferences as those who do longer benefit from educational services in order to earn higher wages in future have a small time preference. Therefore they are less likely to demand pensions or other forms of savings (see for example Börsch-Supan (2001) and Rodepeter (1997) among others).

the degree of risk to become unemployed, on satisfaction with the individual economic and financial situation and on the standard of living.	Riester pension – Private pension –
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Therefore the structural part of the regression can be written as (3)

$$\begin{aligned}
 OP_i = & \alpha_0 + \alpha_1 TEN_i + \alpha_2 FIRMSIZE_i + \alpha_3 INDUSTRY_i + \alpha_4 REGION_i \\
 & + \alpha_5 GENDER_i + \alpha_6 EDU_i + \alpha_7 INC_i + \alpha_8 MARITAL_i + \alpha_9 AGE_i \\
 & + \alpha_{10} FOP_i + \alpha_{11} POSITION_i + \alpha_{12} CHILD_i + \alpha_{13} MOTIVE_i + u_i
 \end{aligned} \tag{3}$$

Afterwards we evaluated what attributes significantly influenced the duration of claims in occupational pensions. Therefore, we did OLS estimations using the same socioeconomic attributes like in equation (3) but with the logarithm of duration (years) of claims in occupational pensions as the dependent variable and the log of income and age as independent variables.

We also tried to estimate determinants of the supply of an occupational pension on firm side.<sup>22</sup> However, due to insufficient attributes of the firms that supply an occupational pension to their employees these regressions could be improved if more firm specific attributes were available.<sup>23</sup> All observations have been weighted in our multivariate analyses. The estimated coefficients of binary and limited variables can not be interpreted as marginal effects but the direction of the effect can be deduced from the estimated sign of the coefficient. However, the dependent variable increases (decreases) with a positive (negative) sign of the exogenous variable.

### 3.3 Results

Our estimation results reported in table 6 and table 7 provide insights into the German occupational pension system and people's pension plan adoption.<sup>24</sup>

[Table 6 about here]

[Table 7 about here]

To start with the **supply** side of our analysis we did regressions on the impact of firm-specific variables influencing the supply of a pension plan by a company (see model 1). It can be shown that income (as a proxy for wages paid) has a negative influence on pension plan sup-

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<sup>22</sup> To do this we used firm-specific information provided by the individual answers of those participating in the GSOEP.

<sup>23</sup> An econometric study on the supply of an occupational pension in Lower Saxony has been carried out by Schnabel and Wagner (1999).

<sup>24</sup> The results of our sensitivity analyses are robust to changes in specifications. The highest explanatory power is represented by the reported model specifications. Stepwise inclusion of the reported exogenous variables and comparisons of the results for the single coefficients and the overall test statistics delivered the models named above.

ply which might be caused by the amount of contributions as a percentage of individual salaries an employer has to pay.<sup>25</sup> Furthermore, we identify statistically significant differences between firm sizes. Firms with a small number of employees (no more than 20) do less often offer an occupational pension plan than firms with more than 2000 employees compared to the reference group.<sup>26</sup> Across lines of business we identified statistically significant differences, too. Financial intermediaries and manufacturing firms are more likely to provide a pension system than firms of the reference group.

Based on model 2 to 5 which give reference to the question whether people **demand** a pension plan and how long they acquire claims from it we are able to point out the following. Model 2 to model 4 can be used to compare the pension plan demand in 1995 (model 2) with that of 2005 (model 3 and 4). We chose model 3 and 4 to test whether the existence of the *Riester* pension has a certain impact on pension provision behavior that differs from that of people who have another form of private pension. Model 2 shows that provision behavior in 1995 is less motivated by personal attributes but caused by firm characteristics. As model 3 and 4 make evident in 2005 individual factors and subjective attitudes become more important. Household income in 1995 does not have the expected positive and (highly) significant influence on the dependent variables as proposed by  $H_5$ . It seems as if people with a higher household income do not care as much for future incomes. It supports Blinder (1982, p. 30-32) who claims that pensions are imperfect substitutes for wages. In 2005 the sign of household income changes to the expected positive influence on the adoption of a pension plan. People who earn higher wages are more able to provide for the future. Furthermore, the impact of age is statistically highly significant in both years which indicates that older people are aware of the fact that they should prepare for their retirement age. The influence of marital status is only predictable for 2005. Therefore it cannot be concluded that single adults seem to be less accountable for others and therefore care less for them. Married have a statistically significant higher probability to participate in a plan in 2005. The influence of being a man is not significant so that it is not possible to reject or confirm the hypothesis of women being better informed than men and therefore having a higher probability to adopt a pension. Given that our analyses include only working men and women this argument needs to be taken carefully. For the UK Johnson et al. (1998) find that marital status and gender are most important for the likelihood to have claims in an occupational pension plan.<sup>27</sup>

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<sup>25</sup> An inclusion of other firm-specific factors (like turnover, firm age or education of the firm owner) could enable us to draw more concrete conclusions on pension plan supply from employer side but due to data shortenings we are not able to do that.

<sup>26</sup> It would be interesting to evaluate whether the age of a company has a statistically significant impact on the supply of an occupational pension plan.

<sup>27</sup> A closer description of female pension coverage (especially for the UK) can be found in Gough (2004) who names for example gaps in employment, lack of pension portability, expectation of the partner to provide for old

On the contrary, it can neither in 1995 nor in 2005 be stated that those who are supposed to be highly educated (people having a university degree) provide less for old age by the second pillar. We are not able to find evidence for a significant impact of the education variable. A possible reason for this result might be that young, high-skilled employees, who are more career-minded, neglect old age pension provision because they want to be more mobile, and are not willing to bind themselves to a company facing reductions in the capital stock if they change jobs. Besides this, high skilled employees might possibly use the third pillar (private pensions) as a substitute for occupational pensions because fewer problems like restricted portability occur there.<sup>28</sup> To control for this with the data of 2005 we use two variables (Riester pension<sup>29</sup> and private pension) that include information about the individuals' attitude towards private pension provision. In 2005, both the ownership of a Riester pension or another private pension has a statistically significant positive influence which is against the opinion that private pensions are substitutes for occupational pensions. It seems as if the chance to care occupationally is higher for those who provide for old age privately as well because they are better informed about the need to save. As both employed men and employed women are included in our analysis it cannot be stated that typically men act as the head of the household and therefore care more for their family. To have children under age 16 living in the household based on the argument of care does not have a statistically significant impact on adoption or duration of claims. But the larger the number of children an individual has in 2005 the less he or she provides for old age. A popular argument for this is that families need to spend money to care for their family and therefore have less money left to save. Furthermore, if people own a plan from a former employer they are more likely to have a plan at their current employer as they seem to be informed about their possibilities and show the willingness to care for retirement income.

Therefore,  $H_4$  can neither be rejected nor confirmed.

Model 5 shows that, besides the arguments named above, being employed as a blue-collar worker does not have a clearly identified influence on both pension plan adoption and duration of plans. Additionally, with tenure being statistically highly significant in model 2 *we are not able to reject  $H_1$* . People who plan to care for retirement income seem to be aware of the

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age, no willingness to reduce income etc. as reasons for not having rights in a pension plan. Guariglia and Markose (2000) do panel estimations for the UK whether differences in savings behaviour across genders occur.

<sup>28</sup> In our study we are not able to control for this possibility as the people participating in the GSOEP have only been asked questions about private provision in 2002. The SAVE dataset we use to control for changes during the past ten years includes answers on private pension provision.

<sup>29</sup> The Riester pension had been introduced in 2001 by the German ministry of labor and social affairs with the aim to support especially people of lower income levels. Therefore people demanding this product are offered support by tax deferrals.



fact that they need to profit from the compound interest effect and therefore are willing and motivated to stay longer at an employer and hold a pension.

Like Mitchell and Andrews (1981), who were able to show differences across lines of business and regions for the US we find both industry and regional effects for Germany which can be identified clearly.<sup>30</sup> People employed in Western Germany are both in 1995 and 2005 statistically more probable to be included in a plan due to historical effects. Besides, people from Eastern Germany might have a different attitude towards financial old age provision as they could rely more on state activity. The economic development of each region and its influence on firms may play an important role because those firms that face a positive economic development are more likely to provide a pension plan due to a higher ability to fund them. Differences in sector-specific demand and supply for occupational pensions may be related to the historical background, too. In construction, sales, hotels and restaurants it has not been common in history to provide pension plans. Another possible reason might be that people employed in sectors like farming and construction have a lower mean tenure than employees in other sectors (see table 8). Therefore they are less likely to provide for old age as they might need to rebuild the capital stock. An argument for the positive sign of financial intermediaries might be that this line of business is one of the external intermediaries to offer pension products. They may use their advantages in information and should therefore be aware of the need to prevent.

[Table 8 about here]

Furthermore, as model 2 points out firm size is an important factor. We find out that a small supply in pension plans occurs in small firms. People employed in firms with 5 to 19 employees have a significantly lower probability to participate in an occupational pension plan and a lower duration of plans than firms employing 2000 and more employees. This can be explained by scale economies and the fact that large firms are more likely to have a historical background in plan provision. Furthermore, large firms are more likely to survive business cycle fluctuations and therefore are more willing to provide a pension plan. The dimension of payments depends on the duration of the plan.

Thus, *we cannot reject hypotheses  $H_2$  and  $H_3$ .*

To control for different attitudes towards saving we include variables that are supposed to capture the current situation of living, risks and other savings motives in our analyzes for 1995 and 2005.

The estimation results make evident that in either case  *$H_6$  cannot be rejected*. People make up different minds on their current standard of living. For 2005 we find evidence that the more

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<sup>30</sup> This may be determined by the number of observations in each category and the resulting variance.

they are satisfied with their economic situation and their standard of living the more likely they are to save for retirement as they want to keep it. This could not be deduced for 1995. Contrary to our assumptions the risk to become unemployed does not have a statistically significant impact. Neither in 1995 nor in 2005 after the crash of the “New Economy” with an increasing number of unemployed people do people save more for retirement if the subjective risk of becoming unemployed rises. If people expect to have a longer life expectancy they are more likely to participate in a pension plan which is some evidence that over time information about financial problems at old age arising from demographic change enhanced. These people tend to be aware of the need to prevent more than by mandatory social security programs. Summarizing, we find that individual income, marital status, age and being occupied in a small or large firm have a huge impact on the decision of a person to stay in a pension plan and to save for a longer period. This is supported by different savings motives. Differences across lines of business could not be identified clearly across all models.<sup>31</sup>

#### 4. Conclusion

Currently pension savings decrease in large companies. Others underestimate the costs arising from offering a pension plan to employees. In most cases a decrease is caused by a large position of pensions in the balance sheet which causes worse ratings with the result of worse conditions for receiving credits. Therefore, rating agencies ask companies to use pension funds or other instruments to reduce internal pension savings. Besides, companies offer pensions to their workforce by several aims (e.g. economic reasons, motive of foresight, responsibility for the workforce). Therefore it is important to evaluate what people look like who adopt an occupational pension. In this analysis we have shown that differences exist both across SMEs and large firms as well as across regions using econometric methods. Our results are supported by other descriptive studies carried out for Germany which indicate that a gap between different firm sizes occurs. We point out that pension plan provision differs across lines of business. These results are in line with theoretical and empirical literature which arguments that employees with low income as well as young employees seem to face information problems concerning the necessity to provide for old age. Besides information problems young people might have a higher discount rate than older people and prefer to spend more money on consumption and do not care for old age. Less provision by single adults and people with

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<sup>31</sup> An analysis for the composition of a pension plan portfolio has been carried out by Domínguez-Barrero and López-Laborda (2007) for Spain. By estimating the influence of different factors on the amount of contributions to different kinds of pension plans they reach results that are similar to ours.

children could not be identified in 1995 but in 2005 people's provision for old age decreases with the number of children.

Concerning information differences across individuals it would be interesting to investigate the effects of individual labor union membership. Labor unions are able to collect and pool information and afterwards pass it to their members. Furthermore they have a huge impact on wage discussions as well as on the offer of fringe benefits. Therefore, labor unions are supposed to have a greater impact on pension provision as has been shown by other authors for the US. Besides, the willingness to participate in an occupational pension plan could be dependent on individual payments to the statutory pension system. It could thus be expected that those paying small amounts to the statutory system are aware of not receiving large paybacks at retirement age and do hence demand occupational plans. Even a distinction between defined benefit and defined contribution plans and the way of financing these plans could have an effect on provision behavior. But due to data limitations we have not been able to examine this.

Important determinants of saving for retirement are individual attitudes and satisfaction with the standard of living. This has been measured by several variables. The more satisfied people are at present the more they want to keep it in future and therefore care more for retirement. According to Terry and White (1998, p. 25) management aspects concerning occupational pensions are of importance as employers should inform their employees about future shortfalls in public pension systems and the need to prevent more. To eliminate the named gaps further research needs to be done on questions concerning the possibility for the state to set incentives for both employers and employees to adopt a pension scheme and improve information policy.

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Table 1: Survey of studies on job mobility and occupational pensions

Hernæs et al. (2006)	Rabe (2004)	Andrietti (2001)	Taylor (2000)	Even/ Macpherson (1993)	Allen/ Clark/ MacDermed (1993)	Gustman/ Steinmeier (1993)
Norway	Germany	Denmark, Ireland, UK, Netherlands	UK	USA	USA	USA
Young employees have a shorter job tenure, they rarely adopt an occupational pension due to the will to get ahead	Mobility varies in terms of sector and wage differentials between employers	Occupational pensions are not repressing mobility internationally, need to differentiate between DB and DC plans	Not able to prove that employees do not change jobs due to occupational pensions	Young males wish to be more flexible and prevent less	Portability serves as a mechanism of selfselection and is mobility enhancing	Lack of pension portability does not affect job mobility, backloading is very low

Source: own creation

Note: DB = defined benefit plan, DC = defined contribution plan

Table 2: Answers to questions about supply and claims of occupational pensions  
(percentages in parentheses)

	supply by a company	Individual is entitled in a pension plan	claims from earlier employer
Yes	1941 (24.16)	1392 (73.15)	467 (5.85)
No	4778 (59.47)	305 (16.03)	7009 (87.78)
Don't know	1315 (16.37)	206 (10.82)	509 (6.37)
total	8034 (100)	1903 (100)	7985 (100)

Note: This table includes self-employed people. Later on, they will be left out of our analysis, because most other studies attribute occupational pensions of self-employed people to the private pillar.

Source: own calculations based on GSOEP, wave 12 (1995)

Table 3: Percentage of claims in terms of firm size

Firm size	Claims in a pension plan	
	no (in %)	yes (in %)
< 5 to < 20 employees	31.09	68.91
20 to < 200 employees	20.47	79.53
200 to < 2000 employees	16.73	83.27
2000 and more employees	15.38	84.62

Note: due to the fact that not all participants in the GSOEP answered questions on pension provision and other financial aspects for different reasons the numbers especially for people who answered “yes” and who are employed in the smallest category of firms might be too large.

Source: GSOEP, wave 12 (1995), weighted, firm size measured by number of employees

Table 4: Number of pension participants with respect to income and firm size

Income quartiles	Firm size (measured by number of employees)				
	Below 5	5 to < 20	20 to < 200	200 to < 2000	> 2000
1 <sup>st</sup> quartile	7	10	23	21	34
2 <sup>nd</sup> quartile	2	19	37	57	39
3 <sup>rd</sup> quartile	5	15	71	114	143
4 <sup>th</sup> quartile	6	23	84	196	354
total	20	67	215	388	570

Source: own calculations based on GSOEP, wave 12 (1995)

Table 5: Private versus occupational pensions (percentages in parentheses)

		Private pension	
		no	yes
Occupational pension	no	1662 (91.7)	150 (8.3)
	yes	234 (80.7)	56 (19.3)

Source: own calculations based on SAVE dataset 2005



Table 6: Estimation results- Determinants of occupational pension plan provision

Dependent variable	<b>Model 1</b> Company offers a pension plan (1995) <sup>1, 10</sup>	<b>Model 2</b> Individual owns a pension plan (1995) <sup>2, 10</sup>	<b>Model 3</b> Individual owns a pension plan (2005) <sup>3, 11</sup>	<b>Model 4</b> Individual owns a pension plan (2005) <sup>4, 11</sup>
<b>Personal attributes</b>				
Income <sup>5</sup>	-0.522*** (-9.00)	-0.621*** (-3.95)	0.00005*** (3.42)	0.00005*** (3.39)
Gender (male = 1)		0.075 (0.56)	0.082 (1.07)	0.075 (0.98)
Marital status (married = 1)		-0.056 (-0.34)	0.344*** (3.80)	0.342*** (3.78)
Age		0.012(*) (1.43)	0.114*** (5.21)	0.113*** (5.14)
Age <sup>2</sup>			-0.001*** (-5.66)	-0.001*** (-5.59)
Education (university = 1)		0.139 (0.91)	-0.043 (-0.40)	-0.058 (-0.54)
Region (Western Germany = 1)		0.292* (1.72)	0.162* (1.82)	0.171** (1.92)
Number of children			-0.087** (-2.56)	-0.076** (-2.24)
Claims at earlier employer		0.342(*) (1.49)		
Tenure		0.021** (2.01)		
<b>Line of business (dummy variables)</b>				
Manufacturing	0.341*** (5.88)	-0.086 (-0.57)		
Financial Intermediaries	0.926*** (6.76)	0.409** (1.98)		
<b>Firm size (dummy variables)</b>				
5 to < 20 employees	-0.642*** (-8.33)	-0.574*** (-2.37)		
2000 and more employees	0.698*** (11.65)	0.001 (0.01)		
<b>Savings motives</b>				
Life expectancy <sup>6</sup>			0.223** (2.41)	0.219** (2.37)
Unemployment risk <sup>7</sup>		-0.029 (-0.25)	-0.014 (-0.89)	-0.013 (-0.78)
Standard of living <sup>8</sup>		0.036 (0.85)	0.044** (2.19)	0.045** (2.22)
Economic situation <sup>9</sup>		0.265*** (2.52)	0.065*** (3.25)	0.063*** (3.17)
Riester pension (yes = 1)			0.230** (1.93)	
Other private pension (yes = 1)				0.235** (2.18)
Estimation method	Binary probit	Binary probit	Binary probit	Binary probit
No. of observations	6200	1299	2229	2229
Wald Test	462.56***	77.00***	139.39***	139.80***
Constant	-0.068	-0.049	-4.443***	-4.433***

<sup>1+2</sup>: based on GSOEP (1995), wave 12<sup>3+4</sup>: based on SAVE dataset wave 2005<sup>5</sup>: in 1995 measured as net household income, in 2005 measured as net household income computed by adding income of the head of the household to that of his or her partner's income<sup>6</sup>: measured on a three-point rating scale: 1 = shorter than average, 2 = approx. average, 3 = longer than average

<sup>7</sup>: in 1995 measured on a three-point rating scale of whether a person is worried about the security of his/her job (subjective classification): 1 = not worried, 2 = slightly worried, 3 = very worried; in 2005 measured on a rating scale (subjective classification for year 2005 to become unemployed):

0% = totally unlikely, ..., 100% = totally likely

<sup>8</sup>: in 1995 measured on a rating scale (subjective classification of the present happiness with the own life as a whole): 0 = low, ..., 10 = very happy ; in 2005 measured on a rating scale (subjective classification for year 2005 of being satisfied with the individual economic situation): 0 = totally unsatisfied, ..., 10 = very satisfied

<sup>9</sup>: in 1995 measured on a three-point rating scale of whether a person is worried about his/her own financial situation (subjective classification): 1 = not worried, 2 = slightly worried, 3 = very worried; in 2005 measured on a rating scale (subjective classification for the future on own economic situation):

0 = very negative, ..., 10 = very positive

<sup>10</sup>: results weighted by a person level projection factor

<sup>11</sup>: weighted results are based on the distribution of income and age of the German sample census

\*\*\*, \*\*, and \* = significant on 1%, on 5%, on 10% level, z-values in parentheses

Reference groups: **line of business**: people employed in agrarian, mining, construction, electricity, sale, hotels, restaurants, and others; **firm size**: less than 5 employees + 20 to < 2000 employees

Source: own estimation, estimated with "Stata SE 9.2"

Table 7: Estimation Results - Determinants of pension plan entitlement duration

Dependent variable	<b>Model 5</b> Duration of entitlement (logarithm) <sup>1; 2</sup>
<b>Personal attributes</b>	
Net household income (logarithm)	-0.238* (-1.54)
Gender (male = 1)	0.292*** (3.97)
Marital status (married = 1)	0.265*** (3.15)
Age (logarithm)	1.61*** (13.24)
Education (university degree = 1)	-0.445*** (-5.10)
Employee status (blue collar = 1)	0.012 (0.14)
Children (< 16 years = 1)	-0.142** (-2.18)
<b>Line of business (dummy variables)</b>	
Manufacturing	0.104 (1.33)
Financial intermediaries	0.119 (1.19)
<b>Firm size (dummy variables)</b>	
5 to < 20 employees	-0.415*** (-2.79)
2000 and more employees	0.183*** (2.58)
<b>Savings motive</b>	
Unemployment risk <sup>4</sup>	-0.098* (-1.81)
Estimation method	OLS <sup>3</sup>
n	990
F-Test	37.53***
R <sup>2</sup> (adjusted)	0.3430
Constant	-4.004***

<sup>1</sup>: results weighted by a person level projection factor

<sup>2</sup>: based on GSOEP (1995), wave 12

<sup>3</sup>: White-heteroscedasticity-consistent OLS estimation

<sup>4</sup>: measured on a three-point rating scale of whether a person is worried about the security of his/her job (subjective classification): 1 = not worried, 2 = slightly worried, 3 = very worried

\*\*\*, \*\*, and \* = significant on 1%, on 5%, on 10% level, t-values in parentheses,

Reference groups: **line of business**: people employed in agrarian, mining, construction, electricity, sale, hotels, restaurants, and others; **firm size**: less than 5 employees + 20 to < 2000 employees

Source: own estimation, estimated with "Stata 9.2 SE"

Table 8: Mean tenure by line of business

	tenure	Standard deviation
Farming/agrarian	10.3	(9.7)
Mining	11.4	(8.3)
Manufacturing of goods	15.8	(10.0)
Electricity	15.8	(11.6)
Construction	11.6	(9.6)
Sale, hotels, restaurants	13.0	(9.5)
Financial intermediation	11.8	(9.8)
others	11.8	(9.4)

Source: own calculations based on GSOEP, wave 12 (1995)

Note: table 8 includes the mean tenure of people who are entitled in an occupational pension plan, numbers are given in years, standard deviation in parentheses